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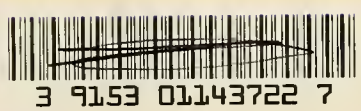
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The Connecticut Agricultural Experiment Station, New Haven

Broccoli and Cauliflower Trials 1993-1994

BY DAVID E. HILL

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SUMMARY

In 1993-1994, a total of 19 cultivars of broccoli and 10 cultivars of cauliflower were grown at Windsor on a sandy terrace soil and at Mt. Carmel on a loamy upland soil. For spring harvest, two crops were planted in late-April and mid-May. For fall harvest, three crops were planted mid-July, early-August, and mid-August (1993 only). In spring crops 1993-1994, average yield of broccoli ranged from 9,380-11,980 lb/A at Windsor and 7,600-12,600 lb/A at Mt. Carmel. In fall crops 1993-1994, average yield of broccoli ranged from 8,830-12,360 lb/A at Windsor and 6,700-12,580 lb/A at Mt. Carmel. Low average yield at Mt. Carmel in fall was due to moisture stress in 1993 and *Rhizoctonia* infection in 1994. In spring, yield of Everest, Arcadia, Eureka, Emerald City, and Mariner exceeded the 1992 national average of 10,300 lb/A and were of excellent quality. In fall, yield of Everest, Eureka, Pinnacle, and Mariner exceeded the national average and were of excellent quality. Only Everest maintained satisfactory yield and quality when planted in mid-August.

In spring 1994, average yield of cauliflower cultivars ranged from 8,380-11,350 lb/A at Windsor and 7,885-11,350 lb/A at Mt. Carmel. In fall 1994, average yield of cauliflower ranged from 15,775-16,665 lb/A at Windsor and 6,625-18,795 lb/A at Mt. Carmel. Low average yield at Mt. Carmel was due to an infection of *Rhizoctonia*.

In spring, Fremont was the only cultivar tested that maintained high yield and quality. In fall, yield of Fremont, Rushmore, Incline, and Siria exceeded the national average of 12,700 lb/A and had excellent quality.

Days to maturity and harvest spans were determined for all cultivars in successional plantings to allow growers to estimate approximate harvest dates for cultivars grown in spring and fall plantings. Cultivars with short harvest spans can be selected for single harvests by hand or machine or long harvest spans to maintain daily supply for roadside stands.

Broccoli and Cauliflower Trials 1993-1994

BY DAVID E. HILL

Perhaps no other vegetable has gained as much notoriety as broccoli in the last 10 years. The American Medical Association and nutritionists have extolled the virtues of members of the genus *Brassica* as important components of human diet. Their high sulforaphane content has been identified as an anti-cancer agent. Consumers have responded by increasing their annual consumption of broccoli from 0.5 lb in 1970 to 3.1 lb in 1994 (Karst 1994). Although annual consumption peaked at 3.8 lb in 1988, the apparent small loss in consumption is probably due to the lack of reporting of home-grown broccoli. The area devoted to broccoli in the United States increased from 77,850 acres in 1980 to 118,400 acres in 1992, a 52% increase (USDA 1993). During the same period, cauliflower increased from 43,320 acres to 56,400 acres, a 30% increase.

Production in Connecticut

Traditionally, broccoli and cauliflower have been grown for local consumption from late June through early October. In 1982, 41 acres of broccoli and 117 acres of cauliflower were grown in Connecticut (Stephens 1988). Most was grown for direct marketing through roadside stands. In 1985, the "Broccoli Project" was established by the Connecticut Department of Agriculture to enlist growers of broccoli to supply two supermarket chains who agreed to sell Connecticut-grown produce. By 1988, broccoli acreage increased to over 100 acres (Hill 1989). The Connecticut Agricultural Experiment Station's role in the Project was testing cultivars (cultivated varieties) to determine those best suited to Connecticut's soil and climate. From 1985 to 1988, 48 cultivars of broccoli and 41 cultivars of cauliflower were tested (Hill 1986, 1987, 1988, 1989). The trials determined yield and quality for spring and fall production.

Current outlook

The rapid growth of the food service industry, which encompasses fast-food chains, restaurants, school and corporate cafeterias, and hospitals, has created an ever-increasing demand for broccoli and cauliflower. Although sales of whole heads of broccoli and cauliflower remain dominant, sales of pre-cut produce has greatly increased. Broccoli and cauliflower can now be purchased as loose or packaged florets and broccoli stems reduced to coins and sticks for party snacks and slaw for salads.

Since the completion of trials in 1988, plant breeders have developed new cultivars of broccoli that alter the shape of the head, ease harvesting and trimming, and provide disease resistance. New cauliflower cultivars have improved self-blanching and disease resistance. Since 1988, seed companies have released at least 21 new cultivars of broccoli and 24 new cultivars of cauliflower.

In this bulletin, I report yield, quality, and maturity of new cultivars of broccoli and cauliflower grown at Windsor and Mt. Carmel in two spring plantings and three fall plantings. I shall also discuss strategies to maximize yields through cultivar selection and appropriate planting dates.

METHODS AND MATERIALS

Soils

The broccoli and cauliflower trials were conducted at the Valley Laboratory, Windsor, on a Merrimac sandy loam, a sandy terrace soil with somewhat limited moisture holding capacity, and at Lockwood Farm, Mt. Carmel (Hamden), on a Cheshire fine sandy loam with a moderate moisture holding capacity (spring crop) and Watchaug loam, a moderately well drained, loamy upland soil with a moderate moisture holding capacity (fall crop).

Cultivars

Seeds were obtained from several domestic suppliers. A total of 19 cultivars of broccoli and 10 cultivars of cauliflower were grown in 1993-1994 (Table 1).

Culture

Details of management of soils and crops and pertinent dates are listed in Table 2.

Seeds for the first and second spring plantings were sown 2 weeks apart in a greenhouse maintained at 50-70F. Four-week-old seedlings were moved to a cold frame for hardening about 10 days before they were transplanted in the field. Seeds for the fall crops were sown outdoors at 2-week intervals in a cold frame. Three fall crops were grown in 1993 and two in 1994. The seedlings of the third fall crop in 1994 lacked vigor and were not planted.

Table 1. Broccoli and cauliflower cultivars grown at Windsor and Mt. Carmel, 1993-1994.

Cultivar	Maturity	1993	1994
BROCCOLI			
Arcadia	Late	x	x
Barbados	Main Season	x	x
Baron	Early		x
Big Sur	Early	x	
Brigadier	Early	x	
Emerald City	Main Season	x	x
Eureka	Late	x	x
Everest	Main Season	x	x
FMX-144	Early		x
Galleon	Early	x	
Legend	Main Season	x	x
Leprechaun	Early	x	
Mariner	Early	x	x
Marathon	Late	x	
Ninja	Main Season	x	
Pinnacle	Late	x	x
Sprinter	Main Season	x	x
Sultan	Late	x	
Super Dome	Late	x	
CAULIFLOWER			
Amazing	Main Season		x
Cashmere	Early		x
Fremont	Main Season		x
Incline	Late		x
Rushmore	Early		x
Serrano	Main Season		x
Sierra Nevada	Late		x
Siria	Main Season		x
Solide	Late		x
White Bishop	Early		x

The seedlings were grown in Promix BX (1993) and Sunshine mix (1994) in standard plastic pots (2 5/8 x 2 1/4 x 2 5/16 inches) held in packs of 36. Water soluble 20-20-20 fertilizer (1 tbsp/gal) was added to the seedlings 1 week before transplanting.

The seedlings were transplanted in rows 36 inches apart with spacing 18 inches within rows (equivalent to 9680 plants/acre). Each planting consisted of five randomized blocks with six plants per cultivar in each replication. Transplanted seedlings that died the first week were replaced.

The soil in the spring and fall crops of cauliflower was sprayed with 5 lb/A boron dissolved in water 1 month following transplanting to prevent hollow stem and browning of curds commonly observed in the 1986 trials (Hill 1987).

In spring, leaves of cauliflower were tied around the developing curds of all cultivars when they reached about 2 inches diameter. In fall, all plants producing 2-inch curds before October 1 were tied. After October 1, leaves of "self-blanching" cultivars were not tied because the inner leaves remained tightly furled around the curd.

Harvest

Mature heads of broccoli and cauliflower were harvested at 3 or 4 day intervals. Broccoli heads were weighed and quality was judged for color, evenness and compactness of the head, excessive stalkiness, and leaves protruding from the head. Cauliflower curds were weighed and quality was judged for weight, color, smoothness of the curd, and its protection by the inner wrapper leaves.

Rainfall

Rainfall distribution throughout the growing season, May-October, is shown in Figure 1. Each bar represents the departure from the mean monthly rainfall for Hartford and Mt. Carmel reported by the National Weather Service. In 1993, total rainfall during May-October was 18.7 inches at Windsor and 16.2 inches at Mt. Carmel, compared to 30-year averages of 19.1 and 19.9 inches, respectively, at each site. The total rainfall at Mt. Carmel was 3.7 inches below average with water deficits occurring in the soil from May through August. Slow plant growth during this period was somewhat alleviated by irrigation. At Windsor, several localized thunderstorms in July provided sufficient water for the crops. Moisture deficits in June and August were alleviated by irrigation.

In 1994, total rainfall during May-October was 28.9 inches at Windsor and 20.4 inches at Mt. Carmel. Slight water deficits at Mt. Carmel occurred in May through July and required irrigation. At Windsor, irrigation was only applied after transplanting if the surface soil was dry.

YIELD AND QUALITY OF BROCCOLI

Spring crops 1993

The average yield of all cultivars, common to both sites, in the first crop was 11,980 lb/A at Windsor and 12,660 lb/A at Mt. Carmel, a 6% difference (Table 3). At Windsor, the yield in 9 of 14 cultivars exceeded the 1992 national average of 10,300 lb/A (USDA 1993). At Mt. Carmel, 10 of 15 cultivars exceeded the national average. At Windsor, the yield of Eureka and Marathon exceeded 17,000 lb/A with heads averaging 1.8 lb. At Mt. Carmel, yield of Arcadia exceeded 19,000 lb/A with 2.0 lb heads while yields of Eureka, Everest, and Marathon exceeded 16,600 lb/A with 1.8 lb heads. At both sites, the large, domed heads of Arcadia and Eureka were of excellent quality. Marathon's large heads tended to be somewhat lumpy in appearance but could be subdivided into florets or used for processing. Although the heads of Barbados, Emerald City, Everest, Mariner, and Pinnacle

Table 2. Soil and crop management of broccoli and cauliflower and pertinent dates, 1993-1994.

ACTIVITY		Spring Crop	Fall Crop
Soil fertilization (Rates based on soil tests)			
10-10-10		1300 lb/A	1300 lb/A
Calcium nitrate (sidedress 1 month after transplanting)		175 lb/A	175 lb/A
Lime (Windsor only—to attain pH 6.5)		2300 lb/A	2300 lb/A
Soluble boron (applied to soil 1 month after transplanting cauliflower)		5 lb/A	5 lb/A
Planting Dates			
Seeding in greenhouse or cold frame	Crop 1	March 12-14	June 14-16
	Crop 2	March 26-28	June 22-30
	Crop 3	-	July 6-14
Transfer to cold frame	Crop 1	April 13-16	-
	Crop 2	April 25-26	-
Transplant seedlings to field	Crop 1	April 29-May 5	July 15-17
	Crop 2	May 14-17	Aug. 2-5
	Crop 3	-	Aug. 16-17
Pest Control			
Root maggots		Lorsban 4E	-
Cabbage worms*		-	Pydrin 2.4E
Flea beetles*		-	Sevin, Pydrin 2.4E
Number of irrigations			
Windsor	1993	4	5
	1994	1	4
Mt. Carmel	1993	2	2
	1994	2	2

*As needed

were somewhat smaller (1.0-1.5 lb), their quality was excellent and most heads could be sold individually. Smaller heads could be bunched, especially Barbados. Galleon, an early maturing cultivar, flowered early, forming 1-2 inch heads. After removing these small heads, the axillary buds developed into 4-5 inch heads suitable for bunching.

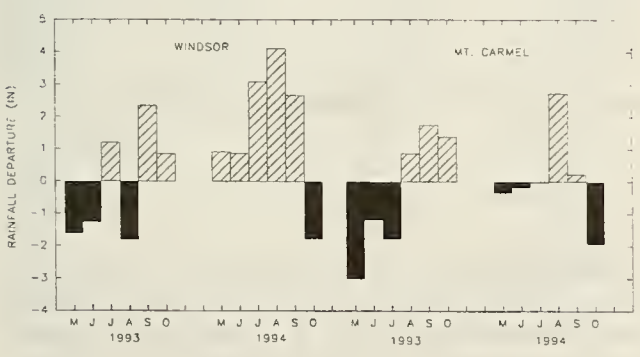

Figure 1. Departure from normal rainfall (0) during the growing seasons 1993-1994 at Windsor and Mt. Carmel.

In the second crop, the average yield of all harvested cultivars was 9,600 lb/A at Windsor and 7,600 lb/A at Mt. Carmel, a 25% difference. The average yield for the second crop was much lower at both sites compared to the first crop because of moisture deficits in the soil due to below-normal rainfall, especially at Mt. Carmel. At Windsor, yield of 7 of 16 cultivars exceeded the national average of 10,300 lb/A. The yield of Super Dome, Eureka, Pinnacle, and Arcadia was above 13,500 lb/A, with heads averaging over 1.7 lb. All provided excellent quality except Super Dome whose heads were somewhat lumpy with unevenly maturing flower buds and small leaves protruding the head. The heads of Emerald City averaged more than 1.3 lb, and were of excellent quality and the heads could be sold individually. At Mt. Carmel, yield of 4 of 16 cultivars exceeded the national average. Yield of Everest and Emerald City exceeded 12,200 lb/A and the heads were of excellent quality. Although the yield of Super Dome exceeded 13,000 lb/A, its unevenly developed heads were of poor quality. The smaller heads of Barbados and Mariner were of excellent quality, but bunching would be required. Galleon again formed very small heads, but once removed, the axillary buds formed 4-5-inch heads early in July.

Table 3. Yield of broccoli at Windsor and Mt. Carmel, Spring 1993.

	Windsor			Mt. Carmel		
Cultivar	Heads Hvst. %	Avg. Head[x] lb	Total Yield[y] lb/A	Heads Hvst. %	Avg. Head[x] lb	Total Yield[y] lb/A
FIRST CROP						
Arcadia	93	1.6a	14,225	100	2.0a	19,360
Barbados	97	1.0bc	9,295	100	1.0bc	10,065
Big Sur	100	0.8bc	7,940	100	0.7c	6,775
Brigadier	-	-	-	93	1.2bc	10,715
Emerald City	100	1.5ab	14,135	100	1.5bc	14.905
Eureka	100	1.8a	17,810	97	1.8ab	16,620
Everest	97	1.4ab	13,335	100	1.8ab	17,520
Galleon	100	0.4d	4,260	97	0.2d	2,065
Legend	100	1.4ab	13,840	100	1.5bc	14,135
Leprechaun	100	0.8bc	8,035	100	0.6c	5,325
Mariner	100	1.3ab	12,390	100	1.6ab	15,005
Marathon	100	1.8a	17,810	100	1.8ab	17,620
Pinnacle	100	1.4ab	13,165	100	1.6ab	15,005
Sprinter	97	1.0bc	9,200	97	1.1bc	10,045
Sultan	100	1.3ab	12,295	100	1.3bc	12,780
SECOND CROP						
Arcadia	90	1.6a	13,590	60	1.1b	6,620
Barbados	93	0.8bcd	7,650	100	1.0b	9,970
Big Sur	97	0.6d	5,730	100	0.3d	3,100
Brigadier	90	0.7cd	6,445	80	0.8bc	6,350
Emerald City	97	1.4ab	12,865	97	1.3a	12,205
Eureka	87	1.7a	14,485	53	1.0b	5,385
Everest	100	1.3b	12,585	100	1.3a	12,390
Galleon	100	0.2e	1,840	100	0.1e	680
Legend	100	1.2b	11,615	83	1.4a	11,170
Leprechaun	100	0.5d	5,035	100	0.3d	2,615
Mariner	90	0.9c	7,930	100	1.0b	9,195
Marathon		Very poor quality			Very poor quality	
Ninja	97	1.0c	8,920	100	1.0b	10,165
Pinnacle	87	1.7a	14,230	30	1.1b	3,135
Sprinter	100	0.6d	6,195	97	0.9bc	8,075
Sultan	100	0.9c	8,615	97	0.9bc	8,730
Super Dome	100	1.6a	15,875	100	1.4a	13,070

[x] Mean separation within columns by Tukey's HSD multiple comparison test at P = 0.05. Values in columns followed by the same letter did not differ significantly.

[y] Based on 1.5' x 3.0' spacing or 9680 plants/A.

Fall crops 1993

The average yield of all cultivars in the first fall crop was 10,885 lb/A at Windsor and 10,090 lb/A at Mt. Carmel, an 8% difference (Table 4). At Windsor, the yield of 10 of 17 cultivars exceeded the national average of 10,300 lb/A. Yield of Pinnacle, Marathon, Emerald City, and Everest exceeded 12,300 lb/A with heads averaging 1.3-1.6 lb. The quality of these cultivars was excellent except Marathon whose heads developed slight to moderate brown beading. Other cultivars with excellent quality were Arcadia, Barbados, Eureka, and Sprinter with heads exceeding 1.1 lb. All except Barbados could be marketed individually. Brown

Table 4. Yield of broccoli at Windsor and Mt. Carmel, Fall 1993.

	Windsor			Mt. Carmel		
Cultivar	Heads Hvst. %	Avg. Head[x] lb	Total Yield[y] lb/A	Heads Hvst. %	Avg. Head[x] lb	Total Yield[y] lb/A
FIRST CROP						
Arcadia	100	1.2ab	11,715	100	1.1ab	11,035
Barbados	100	1.1b	10,455	97	1.1ab	10,515
Big Sur	100	1.1b	10,745	100	1.0ab	9,875
Brigadier	90	1.1b	9,585	97	0.9b	8,730
Emerald City	97	1.3ab	12,395	100	1.3a	12,295
Eureka	97	1.2ab	11,175	97	1.3a	12,395
Everest	100	1.3ab	12,680	100	1.3a	12,195
Galleon	100	1.1ab	10,260	100	1.1ab	10,650
Legend	87	1.1ab	9,600	100	1.1ab	10,455
Leprechaun	90	1.0b	8,800	100	1.0ab	9,970
Mariner	90	1.2ab	10,890	100	1.0ab	9,485
Marathon	83	1.6a	13,175	90	1.3a	11,410
Ninja	97	1.2ab	10,985	90	0.9b	8,015
Pinnacle	100	1.5a	14,520	97	1.3a	12,115
Sprinter	97	1.2ab	10,800	100	0.8b	8,230
Sultan	87	1.2ab	10,445	70	1.2ab	8,200
Super Dome	53	1.3ab	6,825	60	1.0ab	5,980
SECOND CROP						
Arcadia	97	1.0ab	9,765	100	1.2ab	11,325
Barbados	90	0.9b	7,755	100	1.2b	9,665
Big Sur	97	1.1ab	10,420	97	1.4a	12,865
Brigadier	97	1.0ab	9,390	100	1.2b	11,325
Emerald City	87	1.0ab	8,255	100	1.2b	12,100
Eureka	90	1.0ab	8,365	97	1.2b	11,175
Everest	100	1.3a	12,485	100	1.2b	11,520
Galleon	80	0.8b	6,580	100	1.0c	9,195
Legend	57	1.1ab	5,905	97	1.3a	12,160
Leprechaun	77	0.9b	6,485	97	0.9c	8,825
Mariner	100	1.2a	11,420	100	1.1bc	11,035
Marathon	80	0.8b	6,195	97	1.0c	9,670
Ninja	87	1.2a	10,275	93	1.3a	11,435
Pinnacle	100	1.0ab	10,165	97	1.2b	11,645
Sprinter	97	1.0ab	9,485	93	1.1bc	10,265
Sultan		Extensive head rot		73	1.2b	8,620
Super Dome	83	1.0ab	8,355	100	1.3a	12,680
THIRD CROP						
Arcadia	60	0.6ab	3,370	60	0.6ab	3,485
Barbados	67	0.5b	3,435	40	0.7ab	2,865
Big Sur	70	0.7ab	4,745	57	0.8ab	4,360
Brigadier	90	0.6ab	5,140	57	0.8ab	4,415
Emerald City	67	0.7ab	4,410	80	0.8ab	5.965
Eureka	73	0.7ab	4,805		Undeveloped heads	
Everest	97	0.9a	8,730	93	0.8ab	7,380
Galleon	90	0.7ab	5,835	90	0.8ab	7,320
Legend	60	0.6ab	3,660	83	0.7ab	5,785
Leprechaun	90	0.7ab	5,925	93	1.0a	9,090
Mariner	97	0.7ab	6,575	87	0.8ab	6,990
Marathon		Undeveloped heads			Undeveloped heads	
Ninja	53	0.6ab	3,180	90	0.7ab	6,185
Pinnacle	87	0.6ab	4,800	77	0.6ab	4,325
Sprinter	93	0.6ab	5,670	77	0.5b	3,950
Sultan		Extensive frost injury			Extensive frost injury	
Super Dome		Undeveloped heads			Undeveloped heads	

[x] Mean separation within columns by Tukey's HSD multiple comparison test at P = 0.05. Values in columns followed by the same letter did not differ significantly.

[y] Based on 1.5' x 3.0' spacing or 9680 plants/A.

Table 5. Yield of broccoli at Windsor and Mt. Carmel, Spring 1994.

	Windsor			Mt. Carmel		
Cultivar	Heads Hvst. %	Avg. Head[x] lb	Total Yield[y] lb/A	Heads Hvst. %	Avg. Head[x] lb	Total Yield[y] lb/A
FIRST CROP						
Arcadia	90	2.0a	17,600	93	1.9a	16,835
Barbados	100	0.8c	7,560	100	0.6d	6,290
Baron	90	0.3d	2,790	97	0.3e	2,910
Emerald City	93	1.2b	10,805	97	1.3c	12,020
Eureka	77	2.2a	16,325	100	2.0a	19,555
Everest	100	1.6ab	15,200	100	1.7b	16,845
FMX-144	93	0.6ab	5,490	100	0.6d	5,520
Legend	100	1.2b	11,520	97	1.2c	10,800
Mariner	90	1.0bc	8,625	100	0.7d	7,165
Pinnacle	90	1.8a	15,335	83	1.6b	12,775
Sprinter	87	0.7c	6,065	100	0.7d	6,970
SECOND CROP						
Arcadia	97	1.9a	18,120	90	1.2ab	10,195
Barbados	100	1.3c	12,485	97	1.0b	9.670
Baron	97	1.0cd	9,015	93	0.8c	7,200
Emerald City	93	1.7b	15,035	97	1.3a	12,300
Eureka	90	1.9a	16,290	87	1.3a	10,695
Everest	90	1.4c	11,935	100	1.2ab	12,100
FMX-144	100	0.9e	8,615	93	1.0b	8,550
Legend	40	1.0cd	3,835	97	1.1b	10,330
Mariner	100	1.2c	12,005	100	1.0b	10,065
Pinnacle	57	1.7b	9.325	43	1.2ab	5,120
Sprinter	90	0.7e	7,635	93	0.8c	6,930

[x] Mean separation within columns by Tukey's HSD multiple comparison test at P = 0.05. Values in columns followed by the same letter did not differ significantly.

[y] Based on 1.5' x 3.0' spacing or 9680 plants/A.

beading was also observed in Brigadier and Ninja; corky stem occurred in Legend.

At Mt. Carmel, yield of 9 of 17 cultivars exceeded the national average. Yield of Emerald City, Eureka, Everest, and Pinnacle exceeded 12,000 lb/A with heads averaging 1.3 lb and of excellent quality. The quality of Arcadia was also excellent, but heads were slightly smaller. Mariner and Ninja displayed some brown beading and unevenly developed heads.

In the second fall crop, the average yield of all cultivars was 8,830 lb/A at Windsor and 11,055 lb/A at Mt. Carmel, a 20% difference. Increased yield at Mt. Carmel in fall compared to spring reflected a more favorable moisture supply. At Windsor, yield of 4 of 16 cultivars exceeded the national average; 11 of 16 at Mt. Carmel. At Windsor, Everest, whose heads averaged 1.3 lb, had the greatest yield and quality. Although yielding less, Barbados, Emerald City, Eureka, Mariner, and Pinnacle provided excellent quality. All except Barbados could be sold without bunching.

At Mt. Carmel, the greatest yield was from Big Sur, Legend, and Super Dome. Their heads, however, matured unevenly and their quality was only fair. Excellent quality was provided by Arcadia, Emerald City, Eureka, Everest, and Sprinter whose yield exceeded the national average. Head rot was observed in Sultan at both sites.

In the third fall crop, planted in mid-August, average yield of all cultivars was 5,025 lb/A at Windsor and 5,150 lb/A at Mt. Carmel, a 2% difference. Yield at both sites was dramatically reduced as days shortened and temperatures cooled. At both sites and for all cultivars, the average head weighed 0.4 lb. The quality was good for most cultivars and their heads were suitable for bunching. Everest produced the

Table 6. Yield of broccoli at Windsor and Mt. Carmel, Fall 1994

	Windsor			Mt. Carmel		
Cultivar	Heads Hvst. %	Avg. Head[x] lb	Total Yield[y] lb/A	Heads Hvst. %	Avg. Head[x] lb	Total Yield[y] lb/A
FIRST CROP						
Arcadia	97	1.5a	13,710	93	1.5a	13,145
Barbados	100	1.2b	11,810	97	1.2ab	11,270
Baron	100	1.2b	11,230	97	1.4a	12,675
Emerald City	97	1.5a	13,895	87	1.5a	12,970
Eureka	97	1.4a	13,145	93	1.5a	13,145
Everest	100	1.4a	13,550	100	1.5a	14,715
FMX-144	97	1.2b	10,800	93	1.3ab	11,345
Legend	93	1.4a	12,875	90	1.4a	12,195
Mariner	97	1.2b	11,175	100	1.4a	13,360
Pinnacle	97	1.4a	13,615	87	1.5a	12,800
Sprinter	97	1.1bc	10,140	100	1.1b	10,745
SECOND CROP						
Arcadia	100	1.4a	13,070	70	1.2a	8,400
Barbados	100	1.1b	10,455	50	1.1ab	5,225
Baron	100	0.9c	9,000	70	1.0b	6,710
Emerald City	100	1.2ab	12,100	73	1.3a	8,975
Eureka	100	1.3a	12,585	37	1.4a	4,905
Everest	97	1.0b	9,515	40	1.1ab	4,145
FMX-144	97	1.0b	9,860	73	0.9b	6,570
Legend	100	1.0b	9,970	57	1.2a	6,400
Mariner	100	1.3a	12,485	80	1.2a	9.680
Pinnacle	97	1.4a	13,050	87	1.3a	10,780
Sprinter	97	0.9c	8,075	30	0.8b	2,350

[x] Mean separation within columns by Tukey's HSD multiple comparison test at P = 0.05. Values in columns followed by the same letter did not differ significantly.

[y] Based on 1.5' x 3.0' spacing or 9680 plants/A.

largest heads at both sites and could be marketed individually. The quality of Everest was not affected by early light frosts (30-32F). Sultan was severely injured by light frosts at both sites. The late-maturing cultivars Eureka, Marathon, and Super Dome did not develop heads large enough for bunching.

Spring crops 1994

In the first spring crop, average yield of 11 cultivars was 10,665 lb/A at Windsor and 10,700 lb/A at Mt. Carmel (Table 5). At Windsor and Mt. Carmel, yield of 6 of 11 cultivars exceeded the national average. At Windsor, yield of Arcadia, Eureka, Pinnacle, and Everest exceeded 15,300 lb/A. All these cultivars had excellent quality with high-domed to semi-domed heads exceeding 1.8 lb. Baron, FMX-144, and Sprinter, early-maturing cultivars, formed small heads, 1-3 inches diameter.

At Mt. Carmel, yield of Eureka, Arcadia, and Everest exceeded 16,800 lb/A with excellent quality. Arcadia had numerous axillary buds along the main stem and required greater trimming effort. Axillary buds are absent along the main stem of Everest. The upper leaves were easy to trim but no secondary shoots were produced for later harvest. Although the yield of Emerald City and Pinnacle exceeded 12,000 lb/A, their quality was diminished by uneven maturation of the heads that appeared lumpy. These large heads would be more suitable for dividing into florets or processing. Baron and FMX-144 produced small heads due to premature formation.

In the second spring crop, the average yield of 11 cultivars was 11,300 lbs/A at Windsor and 9,380 lb/A at Mt. Carmel, a 20% difference. The lower average yield at Mt.

Carmel was due to slight moisture deficits in May through July compared to moisture surpluses at Windsor. At Windsor, yield of 6 of 11 cultivars exceeded the national average. The yield of Arcadia and Eureka exceeded 16,200 lb/A but their quality was fair because uneven head growth created a lumpy appearance. The yield of Everest exceeded the national average and its quality was excellent with 6-7 inch compact, semi-domed heads. The early-maturing Baron and FMX-144 grew larger heads than in the first crop but their 3-4 inch heads required bunching.

At Mt. Carmel, yield of 4 of 11 cultivars exceeded the national average. The yield of Everest and Emerald City was greater than all other cultivars but only Everest had excellent quality. The low yield of Pinnacle was due to extremely uneven development of the heads rendering many unmarketable.

Fall crops 1994

In the first fall crop, the average yield of 11 cultivars was 12,360 lb/A at Windsor and 12,580 lb/A at Mt. Carmel (Table 6). This crop was uniform in yield and quality at both sites. Ample rainfall created 6-8 inch heads in most cultivars. At Windsor, yield of 10 of 11 cultivars exceeded the national average. Yield of Arcadia, Emerald City, Eureka, Everest, and Pinnacle exceeded 13,000 lb/A. The quality of Eureka, Everest, and Pinnacle was excellent with large compact heads. Although the yield of Arcadia was great, some plants developed corky stem. This stem defect was also observed on Legend.

At Mt. Carmel, yield of all 11 cultivars exceeded the national average. Yield of Arcadia, Eureka, Everest, and Mariner exceeded 13,000 lb/A and all were of excellent quality. Slight brown beading was observed on Emerald City and corky stem on Legend. The early-maturing cultivars, Baron and FMX-144, produced 1.2-1.4 lb heads of good quality in contrast to small heads produced in spring.

In the second fall crop, the average yield of 11 cultivars was 10,925 lb/A at Windsor and 6,740 lb/A at Mt. Carmel, a 62% difference. The low yield of all cultivars at Mt. Carmel was due to the development of wire stem (*Rhizoctonia*) in newly-planted seedlings which killed or severely stunted 39% of the crop.

At Windsor, yield of 6 of 11 cultivars exceeded the national average. Yield of Arcadia and Pinnacle exceeded 13,000 lb/A and quality was excellent. Lower yielding Emerald City, Eureka, Everest, and Mariner also had excellent quality. Corky stem was observed on Legend and Arcadia.

At Mt. Carmel, only the yield of Pinnacle exceeded the national average. Surviving plants exceeded 70% in Arcadia, Baron, Emerald City, FMX-144, Mariner, and Pinnacle with average head weight of 1.0-1.4 lb. Good to excellent quality was found in all cultivars except Baron, FMX-144, and Sprinter whose heads varied in size due to uneven maturity of the heads.

YIELD AND QUALITY OF CAULIFLOWER

Spring crops 1994

In the first spring crop, the average yield of 10 cultivars was 11,350 lb/A at Windsor and Mt. Carmel (Table 7). At Windsor, yield of 4 of 10 cultivars exceeded the 1992 national average of 12,700 lb/A for cauliflower (USDA 1993). Yield of Fremont, Serrano, Solide, and Amazing exceeded 14,000 lb/A. Only Fremont had excellent quality with dense, semi-domed curds averaging 1.8 lb. Despite fairly good protection from wrapper leaves, the curds were tied to ensure blanching. The quality of Serrano was poor. Its large curds had many small leaves protruding. The curds of Amazing were irregular, and premature flowering created a fuzzy surface. The curds of Solide were insufficiently protected by outer leaves despite efforts to tie them. The quality of Rushmore was good although the curds were smaller (1.3 lb) and less dense than Fremont.

At Mt. Carmel, the yield of 3 of 10 cultivars exceeded the national average. Fremont had the greatest yield with curds averaging 1.8 lb. The leaves were tied to blanch the large, dense, semi-domed curds. Amazing, Serrano, and Solide also produced large curds but displayed the same defects noted at Windsor. White Bishop, an early-maturing cultivar, produced curds that were small and irregular in shape.

In the second spring crop, average yield of 10 cultivars was 8,380 lb/A at Windsor and 7,885 lb/A at Mt. Carmel, a 6% difference. At Windsor, only 2 of 10 cultivars exceeded the national average. Yield of Rushmore and Cashmere exceeded 12,000 lb/A but their curds were not compact. Although the yield of Fremont did not exceed the national average, the curds were dense with excellent quality. The quality of remaining cultivars was poor with loose, irregular curds, protruding leaves and premature flowering.

At Mt. Carmel, no cultivars had yields exceeding the national average. Although the dense curds of Fremont were of medium size (1.0 lb), their quality was excellent. In the remaining cultivars, quality was diminished by lack of compactness, protruding leaves and premature flowering.

Fall crops 1994

In the first fall crop, the average yield of 10 cultivars was 16,665 lb/A at Windsor and 18,795 lb/A at Mt. Carmel, an 11% difference (Table 8). Yield of all cultivars exceeded the national average at both sites. At Windsor, yield of Cashmere, Fremont, Incline, and Rushmore exceeded 18,000 lb/A with curds averaging 1.9-2.2 lb. The quality of Fremont, Incline, and Rushmore was excellent. The quality of Cashmere was diminished by rot in some curds and premature flowering in others. Fremont, Incline, Rushmore, and Siria had excellent curd protection from wrapper leaves and did not require tying. Sierra Nevada and Solide had poor head protection and required tying.

At Mt. Carmel, yield of Cashmere, Fremont, Incline,

Table 7. Yield of cauliflower at Windsor and Mt. Carmel, Spring 1994

	Windsor			Mt. Carmel		
Cultivars	Curds Hvst. %	Avg. Curd[x] lb	Total Yield[y] lb/A	Curds Hvst. %	Avg. Curd[x] lb	Total Yield[y] lb/A
FIRST CROP						
Amazing	93	1.6a	14,135	93	1.6a	14,135
Cashmere	93	1.3ab	11,345	87	1.5ab	12,465
Fremont	97	1.8a	16,620	100	1.8a	17,520
Incline	50	1.2b	5,810	43	1.0c	3,995
Rushmore	93	1.3ab	11,795	87	1.4b	11,620
Serrano	80	1.9a	14,945	97	1.6a	15,210
Sierra Nevada	93	1.1b	9.995	83	0.9c	7,470
Siria	93	1.2b	10,715	87	1.4b	11,620
Solide	93	1.6a	14,495	93	1.4b	12,515
White Bishop	100	0.4c	3,620	100	0.7c	6,970
SECOND CROP						
Amazing	80	1.3ab	10,145	70	0.8b	5,285
Cashmere	100	1.4a	13,165	100	1.1a	10,445
Fremont	90	1.3ab	11,240	87	1.0ab	8,085
Incline	33	1.2b	3,770		Undeveloped curds	
Rushmore	97	1.4a	12,930	83	1.1a	9,265
Serrano	70	1.3ab	8,605	93	1.0ab	9,450
Sierra Nevada	30	0.9c	2,495		Undeveloped curds	
Siria	80	1.2b	9,680	87	1.1a	8,925
Solide	23	1.0c	2,340	33	0.8b	2,585
White Bishop	87	1.0c	9,420	97	1.0ab	9,015

[x] Mean separation within columns by Tukey's HSD multiple comparison test at P = 0.05. Values in columns followed by the same letter did not differ significantly.

[y] Based on 1.5' x 3.0' spacing or 9680 plants/A.

Rushmore, and Serrano exceeded 20,000 lb/A with curds averaging 2.1-2.3 lb. The quality of Fremont, Incline, and Rushmore was excellent. The curds of Cashmere were not compact and some flowered prematurely. Some curds of Serrano developed a pinkish cast. The smaller curds of Siria also had excellent quality. The semi-domed curds of White Bishop were somewhat irregular in shape and not compact. Sierra Nevada and Solide had poorly developed wrapper leaves.

In the second fall crop, the average yield in 10 cultivars was 15,775 lb/A at Windsor and 6,625 lb/A at Mt. Carmel, a 138% difference. The large decrease in average yield at Mt. Carmel was due to the development of wire stem in newly-planted seedlings that killed or severely stunted 64% of the crop. At Windsor, yield in 7 of 10 cultivars exceeded the national average. Yield of Fremont and Rushmore exceeded 21,600 lb/A with curds averaging 2.2-2.4 lb. The quality of Fremont, Rushmore, Incline, and Siria was excellent. All had well-developed wrapper leaves which not only blanched the curds but also protected them from early frosts. Curds of Incline, a late-maturing cultivar, were harvested in mid-to-late November without frost injury.

At Mt. Carmel, no cultivars exceeded the national average. Cashmere and Fremont had the greatest yield. Plants of most cultivars, unaffected by wire stem, produced curds exceeding 1.5 lb. Quality of Fremont, Incline, Rushmore, and Siria was good. Other cultivars had defects in curd uniformity, density, and protruding leaves.

MATURITY AND HARVEST SPAN

Knowing the time to produce a mature plant from seed or transplant allows the grower to schedule planting for harvest at a specific time. In Tables 9 and 10, the average days to maturity between Windsor and Mt. Carmel were calculated from the day of transplanting to the day when half of the heads were harvested; i.e. the harvest date of the 15th

Table 8. Yield of cauliflower at Windsor and Mt. Carmel, Fall 1994

	Windsor			Mt. Carmel		
Cultivars	Curds Hvst. %	Avg. Curd[x] lb	Total Yield[y] lb/A	Curds Hvst. %	Avg. Curd[x] lb	Total Yield[y] lb/A
FIRST CROP						
Amazing	93	1.5b	13,505	93	1.7b	15,485
Cashmere	100	1.9ab	18,390	97	2.3a	21,785
Fremont	97	2.0ab	18,405	100	2.3a	21,975
Incline	87	2.2a	18,695	100	2.2a	21,490
Rushmore	100	1.9b	18,490	97	2.1a	20,000
Serrano	97	1.7b	16,245	100	2.2a	21,395
Sierra Nevada	100	1.6b	15,875	97	1.4c	13,615
Siria	97	1.8b	16,805	93	1.9b	17,375
Solide	93	1.7b	15,575	93	1.8b	15,845
White Bishop	93	1.6b	14,585	97	2.0ab	18,965
SECOND CROP						
Amazing	83	0.8d	6,830	20	1.8ab	3,425
Cashmere	100	2.0b	19,360	47	2.0a	9,280
Fremont	100	2.2ab	21,685	47	2.0a	9,145
Incline	97	2.1ab	19,810	37	1.8ab	6,485
Rushmore	100	2.4a	22,940	47	1.9a	8,645
Serrano	97	2.1ab	19,810	43	2.1a	8,740
Sierra Nevada	67	1.1c	7,460	27	1.4b	3,555
Siria	97	2.0b	18,310	40	1.7ab	6,430
Solide	77	1.0c	7,605	30	1.5ab	4,500
White Bishop	100	1.4c	13,940	37	1.7ab	6,230

[x] Mean separation within columns by Tukey's HSD multiple comparison test at P = 0.05. Values in columns followed by the same letter did not differ significantly.

[y] Based on 1.5' x 3.0' spacing or 9680 plants/A.

head from a population of 30 plants. The difference in maturity between sites for each cultivar was seldom more than 3 days.

Maturity of broccoli

In the first and second spring crops 1993, the range in maturity among all cultivars at both sites was 37-60 days (Avg. 50 days) and 26-60 days (Avg. 46 days), respectively (Table 9). Average maturity shortened in response to warmer temperatures and increasing day length. Galleon, Big Sur, and Leprechaun, with maturities shorter than 40 days, produced very small heads. In three plantings for fall harvest, the range in maturity among all cultivars at both sites was 48-90 days (Avg. 62 days), 51-95 days (Avg. 74 days), and 72-102 days (Avg. 74 days), respectively. In fall, days to maturity progressively increased as daylength and temperatures decreased. In the third planting, mid-August 1993, only cultivars with early maturities produced satisfactory yields. Those with later maturities produced smaller heads and were most affected by damaging frosts.

In the first and second spring crops of 1994, the range in maturity among all cultivars was 34-58 days (Avg. 45 days) and 38-61 days (Avg. 45 days), respectively (Table 9). Baron and FMX-144, with maturities less than 40 days, produced very small heads.

In two plantings for fall harvest in 1994, the range in maturity of all cultivars at both sites was 56-72 days (Avg. 64 days) and 68-84 days (Avg. 77 days), respectively. Again, the shortening of maturity in spring and lengthening of maturity in fall was due to the plant's response to changes in temperature and daylength and was consistent with observations in multiple plantings of Chinese cabbage and lettuce (Hill 1991, 1993). Variations in maturity of cultivars within the crop were due to selected genetic variations. The sequential harvesting of cultivars within a crop was always the same irrespective of changes in daylength and temperature.

Table 9. Average maturity (days) of broccoli at Windsor and Mt. Carmel, Spring and fall 1993-1994.

	1993				1994			
	Harvest Midpoint Days		Harvest Span Days		Harvest Midpoint Days		Harvest Span Days	
Cultivar	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
FIRST CROP	4/31*	7/16*			5/3*	7/16*		
Arcadia	60	69	5	14	56	70	3	11
Barbados	48	62	6	12	40	64	8	7
Baron	-	-	-	-	34	64	3	11
Big Sur	37	58	16	11	-	-	-	-
Brigadier	50	62	7	13	-	-	-	-
Emerald City	50	62	10	15	46	64	14	12
Eureka	60	71	8	14	54	68	5	9
Everest	52	54	6	4	51	56	12	8
FMX-144	-	-	-	-	36	56	10	12
Galleon	34	50	7	4	-	-	-	-
Legend	52	60	10	14	42	62	12	10
Leprechaun	38	48	11	2	-	-	-	-
Marathon	60	90	5	3	-	-	-	-
Mariner	50	60	6	10	40	64	7	6
Ninja	-	56	-	9	-	-	-	-
Pinnacle	57	74	4	23	58	72	7	8
Sprinter	50	54	6	7	40	60	11	6
Sultan	52	60	10	10	-	-	-	-
Super Dome	-	69	-	10	-	-	-	-
SECOND CROP	5/16*	8/2*			5/17*	8/4*		
Arcadia	56	84	7	16	56	84	7	16
Barbados	46	75	7	10	42	81	5	12
Baron	-	-	-	-	35	76	7	18
Big Sur	35	70	12	13	-	-	-	-
Brigadier	46	75	18	14	-	-	-	-
Emerald City	49	75	8	14	44	81	6	24
Eureka	56	86	6	18	52	84	8	16
Everest	49	63	7	12	44	70	10	28
FMX-144	-	-	-	-	38	70	10	24
Galleon	26	52	4	12	-	-	-	-
Legend	48	70	6	16	42	76	8	26
Leprechaun	33	51	9	6	-	-	-	-
Marathon	-	95	-	6	-	-	-	-
Mariner	44	74	9	13	42	76	10	21
Ninja	48	68	8	12	-	-	-	-
Pinnacle	56	84	8	14	61	84	4	18
Sprinter	46	66	7	20	35	68	7	14
Sultan	46	70	9	19	-	-	-	-
Super Dome	49	77	12	13	-	-	-	-
THIRD CROP		8/18*						
Arcadia	-	98	-	16	-	-	-	-
Barbados	-	94	-	20	-	-	-	-
Baron	-	-	-	-	-	-	-	-
Big Sur	-	87	-	12	-	-	-	-
Brigadier	-	90	-	16	-	-	-	-
Emerald City	-	84	-	16	-	-	-	-
Eureka	-	102	-	16	-	-	-	-
Everest	-	78	-	18	-	-	-	-
FMX-144	-	-	-	-	-	-	-	-
Galleon	-	72	-	20	-	-	-	-
Legend	-	84	-	18	-	-	-	-
Leprechaun	-	69	-	8	-	-	-	-
Marathon	-	-	-	-	-	-	-	-
Mariner	-	84	-	18	-	-	-	-
Ninja	-	91	-	21	-	-	-	-
Pinnacle	-	98	-	24	-	-	-	-
Sprinter	-	90	-	14	-	-	-	-
Sultan	-	-	-	-	-	-	-	-
Super Dome	-	-	-	-	-	-	-	-

*Average transplanting dates between both sites for all crops.

Maturity of cauliflower

In the first and second spring crops of 1994, the range in maturity among all cultivars at both sites was 38-64 days (Avg. 54 days) and 50-64 days (Avg. 54 days), respectively (Table 10). White Bishop, with a maturity of 38 days in the first crop, produced very small curds.

In the first and second fall crops, 1994, the range in maturity among all cultivars at both sites was 73-90 days (Avg. 80 days) and 92-104 days (Avg. 94 days), respectively. Sufficient time was available to harvest all cultivars in the second crop even though late-maturing cultivars were subjected to early frost without damage to the curds. Average maturity of the second planting for fall harvest was 40 days longer than either of the spring plantings in response to shorter daylength and cooler temperatures.

Harvest span

Another important facet of maturity is harvest span which I define as the days between the harvest of 95% of the crop. Single heads or curds that matured very early or very late in comparison to the whole population within the cultivar were excluded. Short harvest spans favor a single harvest by hand or machine. Longer harvest spans require multiple pickings by hand. In general, hybrid cultivars have greater genetic uniformity and maturity is more closely controlled. Open pollinated cultivars have greater diversity in maturity and tend to have longer harvest spans. The harvest span of individual cultivars was observed to be shorter in spring crops than in fall crops for many cultivars. For example, in 1993, the average harvest span for spring crops of broccoli was 8-9 days; in fall, the average harvest span at both sites for three successive crops increased to 10, 13, and 16 days, respectively (Table 9). As daylength and temperature decreased, growth of individual plants decreased and the maturity of individual plants became more diverse. Among the spring crops, Arcadia, Barbados, Pinnacle, and Sprinter had shorter harvest spans than other cultivars. In fall, Leprechaun and Marathon had the shortest harvest spans in all three crops.

In 1994, the average harvest span for both crops of broccoli in spring was 7-8 days; in fall it increased from 9 days in the first crop to 20 days in the second crop (Table 10). Arcadia, Baron, and Pinnacle had the shortest harvest spans in spring; in fall, Barbados and Sprinter.

In 1994, average harvest span of all cauliflower cultivars was 8-10 days in spring, and increased to 14-15 days in fall. In spring and fall, Fremont consistently had a shorter harvest span compared to others.

MANAGEMENT

Selection of cultivars

The 1993-1994 trials demonstrated that several new cultivars of broccoli and cauliflower, released since 1988, have desirable yield and quality characteristics that are consistent with profitable commercial production and enjoyment by home gardeners in Connecticut. These new cultivars (Table 11) can be added to those reported earlier (Hill 1989) for Connecticut for broccoli: Premium Crop, Green Comet, Symphony, Packman, Cruiser, Emperor, and Green Valiant, and for cauliflower: Andes, Polar Express, White Knight, White Fox, White Rock, Taipan, Candid Charm, and Snow King.

As a group, the new broccoli cultivars have been bred for dome-shaped heads which shed water to lessen the probability of head rot. Many new cultivars also have heads which rise above the main canopy of leaves to facilitate harvest with a minimum of trimming. Those with excellent yield and consistent quality are listed in Table 11.

Planting strategies can be developed to satisfy objectives for a series of single harvests to supply a supermarket chain or multiple harvests to maintain a daily supply for retail at roadside stands.

For single-harvests, cultivars with short harvest spans are desirable. Among the broccoli cultivars tested in spring, Everest, Arcadia, Mariner, and Barbados had excellent yield and quality, and harvest spans less than 1 week. In fall, only Everest had a short harvest span when planted by mid-July.

Multiple harvests of single cultivars with harvest spans lasting up to 2 weeks, were provided by spring-planted Arcadia or Barbados. In fall, multiple pickings, lasting 2 weeks, were provided by all cultivars planted mid-to-late July except Everest. If planted in early August, harvest of most cultivars lasted about 3 weeks.

Multiple harvests in spring were also attained by planting a combination of cultivars with different maturities. Everest, Barbados, or Mariner planted with Arcadia or Eureka provided a 2-week harvest from a single planting. With similar combinations of cultivars in fall, the harvest span was extended to 3 weeks.

For ease of harvest, Everest, Barbados, and Pinnacle were satisfactory choices. Their heads were exerted well above the foliage, and axillary buds were not well developed. Although these cultivars were easy to trim, they did not provide sprouts for subsequent harvest. The heads of Arcadia, Eureka, and Mariner were well developed but prominent axillary sprouts along the upper portion of the main stem required more time and effort to trim. These cultivars developed excellent side shoots for subsequent harvest.

For cauliflower, choices are fewer. The only new cultivar that consistently had high yield and quality in spring was Fremont. Although Fremont had good wrapper leaves, its curds were tied in spring to prevent exposure to sunlight. Since Fremont's harvest span in spring is short, multiple harvests could be accomplished by using White Fox as a companion. White Fox's maturity in spring was about 61

Table 10. Average maturity (days) of cauliflower at Windsor and Mt. Carmel, Spring and fall 1994

	Harvest Midpoint		Harvest Span	
Cultivar	Spring Days	Fall Days	Spring Days	Fall Days
First crop	5/3*	7/16*		
Amazing	54	89	3	16
Cashmere	54	75	12	12
Fremont	54	75	8	10
Incline	64	87	11	23
Rushmore	54	73	10	14
Serrano	54	78	6	10
Sierra Nevada	63	90	12	22
Siria	51	76	12	13
Solide	58	90	10	19
White Bishop	38	70	8	10
SECOND CROP	5/17*	8/4*		
Amazing	59	95	11	16
Cashmere	50	86	10	12
Fremont	58	92	5	14
Incline	57	100	7	18
Rushmore	50	93	16	15
Serrano	58	88	12	16
Sierra Nevada	64	104	7	10
Siria	56	92	16	16
Solide	63	104	6	12
White Bishop	44	90	10	14

*Average transplanting dates between both sites

Table 11. Selection of cultivars with uniform yield and quality of broccoli and cauliflower for transplanting at specific times during the growing season.

	Late April-Early May	Mid-May	Mid-July	Early Aug.	Mid-Aug.
Broccoli	Everest Eureka Arcadia Barbados* Mariner*	Everest Eureka Arcadia Emerald City Barbados* Mariner*	Everest Eureka Pinnacle Mariner Baron Barbados*	Everest Eureka Pinnacle Emerald City Mariner Baron	Everest Baron*
Cauliflower	Fremont	Fremont	Fremont Rushmore Incline Siria	Fremont Rushmore Incline Siria	

*Suitable for bunching

days in spring with a 2-week harvest span (Hill, 1989). In fall, Rushmore, Incline, or Siria with Fremont provided a 3-week harvest.

In choosing the best cultivars to use for a specific planting, there are a few general rules to be considered based on observations. For April transplantings, cultivars with early

maturities seldom produced as well as those with mid-to-late maturities. For late spring transplantings, cultivars with late maturities were more prone to head deformity due to encroachment of summer heat compared to cultivars with early-to-mid maturities. In fall, most cultivars transplanted in late July through early August produced satisfactory yields irrespective of maturity. For transplanting in mid-August, only cultivars with early-to-mid maturities produced satisfactory yields. Those with late maturities did not form saleable heads or curds before frost damaged the crop.

Planting dates

The transplanting window in spring was more restrictive than in fall. In the Connecticut Valley and along the shoreline, transplanting between April 20 and May 15 was successful. In the Eastern and Western Highlands, where the soil and air temperatures in spring rise more slowly, transplanting should be delayed until May 1. At this time there is still a 1 in 10 chance of a late spring frost (Brumbach 1965). In cooler areas of the state, transplanting should be completed by May 20.

In fall, transplanting for early fall harvest can commence July 15 and continue through August 15 in the Connecticut Valley and shoreline. In cooler areas of the Eastern and Western Highlands, transplanting for fall harvest of broccoli and cauliflower should be completed by August 1.

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